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Factors Related to Potentially Preventable Readmissions within New York's medicare Patient Population

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Factors Related To Potentially Preventable Readmissions Within New York's
Medicare Patient Population

BY

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Abstract

Hospitalizations are the most expensive type of care within the healthcare system. Yet many patients find themselves frequently returning to the hospital, particularly those in Medicare. Hospital readmission rates for Medicare patient's range between 18 to 20 percent, higher than other private insured patients. In an effort to reduce spending within Medicare, federal reimbursements will decrease to penalize hospitals performing below national benchmarks. As an indicator of quality of care, readmission rates may identify areas of weakness within the healthcare continuum, and may occur as a result of a combination of different factors. Some of these factors include but are not limited to, incomplete treatment, poor care of the underlying problem, poor coordination of services, medication compliance and follow up care.

Specific causes for hospital readmissions vary across studies. This study attempts to identify factors related to hospital readmissions within New York State using available county data. The result of the multiple regression analysis indicates that communities with a large Black demographic population are at higher risk for readmissions. Also, hospitals whose patients responded that they did not always receive information on what to do during their recovery at home have an increase risk for readmission. Future studies are needed to identify specific factors that affect readmission at the individual level as county level data does not significantly predict readmissions.

To My Parents For All Their Love and Support

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Introduction

The purpose of the capstone paper is to capture the student's understanding of both theory and practice throughout the course of the public administration program. As a requirement students must complete an internship, identify a problem within the site and develop a possible solution which is incorporated into the capstone paper. The following study is not a traditional capstone paper and does not focus on a particular internship.

I successfully completed my internship at a hospital located in the Bronx, NY. However, the organization decided not to participate in the project. During my internship, a current challenge facing the hospital was reducing preventable patient readmissions. Although this capstone does not focus on the hospital or its challenge with readmissions; the topic remained the same as it is a problem affecting many hospitals throughout the United States.

Practical Problem

Ensuring the delivery of high quality cost effective patient care is essential for healthcare facilities, particularly hospitals. Hospitalizations are one of the most expensive types of care within the healthcare continuum and account for 31% of total health care expenditures in the United States (Minott, 2008). However, the high cost of care does not necessarily indicate that the patient is receiving quality care. As a measure of performance in care delivery hospital readmission rates have been identified as an indicator for quality of care (Halfon et. al., 2006; CMS, 2009). Recent readmission trends indicate that New York State hospitals fare significantly worse on readmission rates than any other state in the nation (Hospitalcompare.gov; Hartocollis, 2009).

Readmission rates may identify areas of weakness within the healthcare continuum and occur as a result of a combination of different factors. These include but are not limited to,

incomplete treatment, poor care of the underlying problem, poor coordination of services before and after discharge, or non adherence to the discharge plan, medication compliance and follow up care (Goldfield et. al., 2008; Minott, 2008). Other factors include the patient's socioeconomic status and whether they are insured, underinsured or uninsured. Readmission rates also differ by hospitals, states and geographic areas (Minott, 2008). As a result, predicting patients who are at high risk for re-hospitalization is often difficult and inaccurate to determine. While some readmissions are desirable and part of the planned care, others may be indications of a quality issue related to shortened length of stay and premature discharge (Simmons, 2009).

The incentives for hospitals to reduce length of stay have changed dramatically over the years. In 1983 legislation establishing cost-based payments for hospital days and services were replaced with a set payment per admission that was based on the patient's diagnosis-related group (Epstein, 2009). The objective of the legislation was to encourage shorter lengths of stay and more efficient care. However, the possibility existed that readmissions rates increased as a direct result of the legislation. This could have been due to patients prematurely discharged or because services might be "unbundled" by hospitals in an attempt to receive two separate payments for what could have been a "single clinical episode" (Epstein, 2009). Incentives to reduce readmissions were changed once again with the pay for performance initiative (Averill et. al., 2009). Pay for performance seeks to link payment with quality and to monetarily reward providers who meet targets for process measures and outcomes (Averill et. al., 2009).

The changes in reimbursement practices have significantly affected the type of care received by certain patient population such as those on Medicaid and Medicare. Medicaid hospital payment rates tend to be lower than the payment rates hospitals receive for Medicare and private patients (Catlin et. al., 2008). As a result, many hospitals are less willing to take

Medicaid patients making access to care for those patients limited (Catlin et. al., 2008). Medicare reimbursement payments are also lower than private insurers, which could affect quality and accessibility to care.

Overall the Medicaid and Medicare patient population is the most vulnerable for hospital readmissions, costing billions annually (Minott, 2008). The Medicare Payment Advisory Commission (MedPAC) has estimated that readmissions result in $15 billion in additional annual Medicare expenditures (MedPAC, 2007). To address overspending in the Medicaid and Medicare programs, the Deficit Reduction Act (DRA) of 2005 was created to reinforce pay for performance initiatives. DRA required Medicare to eliminate any increase in hospital payments for occurrences of certain inpatient complications such as, hospital acquired conditions (Averill et. al., 2009). The DRA focuses on an outcome of care as opposed to a process of care and imposed financial penalties for poor outcomes (Averill et. al., 2009). Currently FY2010 budget from the Obama Administration has also proposed payment reductions for readmissions as one means for controlling Medicare expenditures (CMS, 2009).

Conceptual Framework

Readmissions rates may indicate a combination of quality related weaknesses within the hospital. It may also serve to gauge the patient's involvement in the recovery process, resulting in several possible reasons for readmissions. As each hospital meets the needs of their specific patient population, readmission rates may occur and indicate unique challenges facing that particular hospital. Performance measures are tools used in the health sector that enable hospitals to determine areas for improvement. In the case of hospital readmissions, performance measures may result in the development of programs and guidelines addressing their particular challenges.

However, a major challenge facing hospitals are the factors affecting readmissions that are out of their control.

The United States spends approximately 16% of its gross domestic product (GDP) on healthcare, an expenditure expected to increase within the next couple of years (WHO, 2009). With an increase in cost and a weak economy, the healthcare industry has been seeking methods to control and reduce its expenditures, while continuing to provide quality patient care. As a result, performance measurements have become key instruments for improvement. Performance measures can also be seen as an agent for change and are commonly used to improve areas within healthcare such as, patient safety, quality improvement, outcome measures, efficiency, and effectiveness (Moullin, 2002).

Performance measurement has been defined as the process of "evaluating how well organizations are managed and the value they deliver for customers and other stakeholders" (Moullin, 2002). In the healthcare sector performance measurements are difficult tasks, as there are many stakeholders involved and the effectiveness of measures used varies considerably (Moullin, 2009). The measures and targets used in performance measurements must be based on the outcomes that are of most importance to patients and care givers. In identifying these outcomes organizations must "recognize that those who use specific services may have different requirements and expectations" (Moullin, 2009; Jowell & Rothwell, 1988). Multiple factors affect health outcomes, such as socio-economic status, lifestyle, gender and genetics. However, many health organizations' performance measures focus on one or a few of these factors, resulting in a fragmented picture of the organization's performance.

The Centers for Medicaid and Medicare (CMS) have identified hospital readmissions as a quality indicator (CMS, 2009; Halfon et. al., 2006). This recent addition to hospitals indicators

has stimulated performance improvement initiatives that will allow hospitals to provide cost effective quality patient care. The literature suggests various perspectives on improving readmission rates and on identifying possible influential factors. It also demonstrates how hospitals and government organizations use performance measures to identify and develop best practices to address their weaknesses.

Literature Review

Hospital readmission rates have increased within the last few decades exposing the flaws within the care continuum, particularly for Medicare patients. Many patients discharged from an inpatient stay find themselves returning to the hospital within 30 days (Goldfield et. al., 2008; Minott, 2008; Counterpoint, 2001; Mulvany, 2009). According to the literature, hospitalizations account between 30-60% of health care expenses, of which 13% of inpatients in the United States use more than half of all hospital resources through repeated admissions (Counterpoint, 2001; Benbassat & Taragin, 2000; Steffens et. al., 2009). The Centers for Medicare and Medicaid Services (CMS) reported that 18% of Medicare patients are re-hospitalized within 30 days of being discharged (Steffens et. al., 2009). Other published literature on readmission support CMS findings, concluding that readmissions rates for Medicare patients is between 18-20% (Mulvany, 2009; Goldfield et. al., 2008; Counterpoint, 2009) The majority of literature available on readmissions discusses the issue as either, an economic concern or as a measure of outcomes of the quality of care within hospitals (Counterpoint, 2001).

The rising cost of healthcare has motivated payers and purchasers to focus on areas of high cost that yield low quality such as, readmissions within the Medicare population (Bisognano & Boutwell, 2009). Readmission is a large healthcare expenditure with an annual Medicare

readmission expense of approximately $15 billion of which, the Senate Finance Committee estimates that 75% (approximately $12 billion) are potentially avoidable (Steffens et. al., 2009; Minott, 2008; Mulvany, 2009; Bisognano & Boutwell, 2009; Averill et. al., 2009). However, estimates of how many are preventable vary widely depending on patient population and definition used for preventability (Greenwald & Jack, 2009). The potential savings from readmissions has even influenced commercial payers to require reporting of hospital or physician specific 30 day readmission rates (Bisognano & Boutwell, 2009). Early readmissions are significantly associated with the process of inpatient care. Medicare patients who were readmitted were approximately 55% more likely to have had a quality of care problem (Goldfield et. al., 2008). In many cases readmissions represent a limitation in a hospital's planning and care process, or in the ambulatory support system, or in the community (Bisognano & Boutwell, 2008). Focusing on the transition of care, will allow hospitals the opportunity to improve the quality of care patients receive while decreasing expenditures.

Defining Potentially Preventable Readmission

Variations within the literature of readmission rates may occur due to lack of uniformity in defining readmissions and the form of measurement, time interval (7-30 days), conditions included and excluded (Bisognano & Boutwell, 2008). Readmissions may be considered avoidable, unavoidable, planned or unplanned. Readmissions that are avoidable are mainly due to lack of follow-up care coordination or other problems such as, behavioral choices (Minott, 2008). Behavioral choice such as, non-compliance with dietary recommendations, may cause an avoidable readmission even though proper outpatient care coordination occurred (Minott, 2008). Goldfield et. al. (2008) states that a "readmission may also be considered clinically related to a prior admission and potentially preventable if there was a reasonable expectation that it could

have been prevented by one or more of the following: the provision of quality care in the initial hospitalization, adequate discharge planning, adequate post-discharge follow-up, or improved coordination between inpatient and outpatient health care teams" (p.76). Similarly Minott (2008) defines an avoidable readmission as an "adverse event that occurred during the initial admission or as a result of inappropriate care coordination following discharge" (p. 3)

In the study conducted by Goldfield et. al. (2008) a "readmission was related to the initial admission if the readmission was for a continuation or recurrence of the reason for the initial admission, or for a closely related condition" (p. 77). If the readmission was for an acute medical complication related to care during the initial admission, or for a surgical procedure to address the reoccurring problem, then the readmission was considered clinically related (Goldfield et. al., 2008). A readmission that did not correspond to one of those categories was classified as a clinically unrelated readmission, which was not potentially preventable.

Selection of the readmission time interval also varied from study to study. Readmission time interval refers to the maximum number of days allowed from the discharge date of the first admission and the admitting date of the following admission (Goldfield et. al., 2008). Some of the studies describe readmissions within 2 weeks, 1 month and 3 months from the time of the initial admission (Counterpoint, 2001; Mulvany, 2009; Minott, 2008). Few studies discussed readmission within the context of 6 months to 1 year from the time of the first admission. The readmission time interval is important because it will have a significant effect on the number of readmissions discovered in a hospital. For example, 30 versus 15 days readmission time interval will identify more readmissions (Goldfield et. al., 2008). "Longer time intervals after the initial admission decrease the likelihood that a readmission was related to the clinical care or discharge planning in the initial admission and increase the relative importance of outpatient management

of chronic illness" (Goldfield et. al., 2008 p. 77). Readmission rates of 30 days after initial admission has been the most widely used readmission time interval for the definition of hospital readmissions (Goldfield et. al., 2008). Readmission intervals such as 15 or 7 days will have more appeal to "hospital personnel, because they have the greatest degree of control over the processes of care during the hospitalization, and the discharge planning process and much less control of care beyond the immediate post discharge period" (Goldfield et. al., 2008 p. 77).

Studies also differed in terms of the inclusion and exclusion of certain medical conditions. For example, Goldfield et. al., (2008) excluded patients associated with burns, cancer and chronic conditions such as cystic fibrosis, discharges with "left against medical advice", neonatal, obstetrical and eye care admissions (p. 76). A study conducted by Benbassat & Taragin (2000) excluded psychiatric and pediatric ward admissions and focused on medicine and surgical departments (p.1075). However, the study did not provide an extensive exclusion list, similar to the Goldfield et. al.(2008) study. Many of these studies excluded diagnoses that were known to cause readmissions regardless of the quality of care provided, such as patients with cancer. Patients who "left against medical advice" are no longer the responsibility of the hospital. Therefore, including these patients would create inaccurate readmission rates. The lack of consistency between studies reflects the variations in rates and results on the effects of readmissions to patients, communities and hospitals.

Possible Reasons for Preventable Readmissions

The discrepancies within reporting readmission are also affected by the fact that not all readmissions are preventable, even with optimal care (Goldfield et. al., 2008). Readmissions occur for various reasons and circumstances causing many patients to frequently return to the hospital. The literature available focuses on either a defect within the care of a specific condition,

such as heart failure or it generalizes possible reasons for readmission. Those with specific

diagnostic such as heart failure are more likely to return to the hospital and are said to be at a

greater risk (Counterpoint, 2001). Generally the factors causing readmissions include prior

hospitalization, post-discharge follow-up appointment time provided prior to discharge, lower

socioeconomic status, low literacy, reduced social network indicators, and unmarried/widowed

individuals (Greenwald & Jack, 2009; Counterpoint, 2001; Minott, 2008; Epstein, 2009). Other

factors include premature discharge, age of the patient, gender particularly men, chronic

disability, patient living alone, unavoidable relapses, inadequate medical management, poor self-

rated general health, inadequate rehabilitation and poor discharge planning (See Table 1)

(Counterpoint, 2001; Bisognano & Boutwell, 2008).

Specifically for readmission that are potentially preventable gaps in planning for the

transition of care, failure in communication, and delays in scheduling post-hospitalization care

contribute to readmissions (Bisognano & Boutwell, 2008). The length of stay of the initial

hospital stay and the rate of readmission are also believed to be a factor of potentially

preventable readmissions. The literature suggests that an increase rate of readmission is the

inevitable price of early discharge (Counterpoint, 2001 p. 1; Minott, 2008; Goldfield et. al.,

2008). However, the positive relationship between readmissions rate and length of stay has not

yet been established (Counterpoint, 2001).

Currently hospitals report readmission rates on three diagnoses: congestive heart failure,

acute myocardial infarction, and pneumonia (Mulvany, 2009). Since hospitals do not report on

several other diagnoses and factors it is difficult to determine the exact cause for readmission. It

also provides a skewed readmission rate as those with heart problems are more susceptible to

return to the hospital, thus increasing the readmission rate. The rates of readmission rates are also

difficult to interpret since the information provided by hospital is limited. Also higher readmission rates may represent more efficient care rather than premature discharge, inadequate handoffs, or poor quality of care after discharge (Epstein, 2009). Table 1 lists possible reasons for readmission gathered from the literature.

Table 1: Possible Factors Related to Readmission

Prior hospitalization for diagnosis such as heart attack and pneumonia
Post discharge planning
Socioeconomic status
Education
Marital status
Premature hospital discharge
Hospital length of stay
Age
Number of beds in hospitals
Gender
Patients behavioral choices (compliance with medicine and follow up appointments)

Pay for Performance

Incentives for hospitals to reduce their length of stay have changed dramatically over the years. The current incentive is a pay for performance model which seeks to link payment and quality (Goldfield et. al., 2008; Averill et. al., 2009; Epstein, 2009). Pay for performance financially rewards providers who meet targets for process measures and intermediate outcomes (Averill et.al., 2009). The Deficit Reduction Act (DRA) of 2005 contributed to the pay for performance; in that it required Medicare to eliminate any increase in hospital payments for occurrences of certain inpatient complications such as, hospital acquired conditions (Averill et.

al., 2009). The DRA focuses on an outcome of care as opposed to a process of care and imposed financial penalties for poor outcomes (Averill et. al., 2009).

As a quality indicator readmissions can reflect poor quality and have been found to substantially increase Medicare expenditures (Goldfield et. al., 2008; Averill et. al., 2009). Both MedPAC and Centers for Medicaid and Medicare Services have recommended that hospital payments for readmission be reduced (MedPAC, 2007). The FY2010 budget from the Obama Administration has also proposed payment reductions for readmissions as one means of controlling Medicare expenditures. Governor David Paterson budget seeks to close a projected $7.4 billion deficit for FY 2010–11 (GNYHA, 2010). As a result, "Medicaid payments to hospitals that perform below quality benchmarks related to potentially preventable readmissions and conditions will be reduced (the proposal envisions bonus payments for hospitals that perform well or improve, as well as assistance to prevent readmissions for certain providers)" (GNYHA, 2010).

In response to the fiscal changes and the increase awareness and importance of readmissions, Averill et. al., (2009) suggests a redesign of the inpatient prospective payment system that would reduce payments to hospitals that have high-risk readmission rates (Averill et. al., 2009). Averill et. al., 2009 uses the identification of potentially preventable readmissions method by Goldfield et. al., (2008) and readjust the readmission rates of hospitals to obtain an accurate readmission rate. The study supports the current budget reduction proposals and uses readmission rates as a quality indicator that will influence reimbursement for hospitals. However, these changes are complicated since there is no single medical error that causes readmission, as it may be a result from a series of oversights and inadequacies in the course of the hospitalization or the discharge planning and post discharge care follow ups (Averill et. al., 2009 p. 2).

Best Practices for Reducing Hospital Readmissions

The Centers for Medicaid and Medicare highlight two studies in their attempt to reduce hospital readmissions within the Medicare population, Bisognano & Boutwell (2008) and Goldfield et. al.(2008). The complexity of readmissions requires a comprehensive approach to reduce readmissions. Since there are several areas of the care continuum that affect readmission, interventions that address these defects are needed. Possible interventions to reduce readmissions include: accurate medication reconciliation, effective patient education, patient centered discharge planning, post acute patient/caregiver support; referral for appropriate intensity of post acute follow up; communication of a clear understanding of clinical prognosis to patients/caregivers; and proactive end of life care planning (Bisognano & Boutwell, 2008).

Attending to the needs of the patient's medication at discharge is highly important in an attempt to reduce readmissions. Ensuring the patient is educated on their medicine and is aware of side effects could reduce unnecessary admissions to the hospital. Some hospitals arrange for physicians and nurses to review a list of indications' and contraindication for medications, which will also reduce avoidable readmissions (Bisognano & Boutwell, 2008). Improving communications with patients before and after discharge, improve coordination and communication with other providers are also beneficial for reducing readmissions (ibid). Reviewing successful practice patterns within hospitals and providing physicians with feedback also reduces avoidable readmissions. Targeting initiatives towards high-risk populations can also significantly reduce readmissions, especially since many of the preventable readmissions are within the Medicare population. Early post acute follow ups within 48-72 hours for high risk patients with either a physician or nurse would allow patients to ask questions, reducing unnecessary hospital visits. However, specific type of readmission will be preventable for some

patients and not preventable for other patients (even after exclusions of patients for whom the readmission is clearly not preventable) (Goldfield et. al., 2008; Bisognano & Boutwell, 2008).

Table 2 shows the ideal transition home model which enhances admission assessment of post discharge needs, enhances teaching and learning and enhances communication at discharge; and timely post acute care follow up (Bisognano & Boutwell, 2008). Strengthening current practices within hospitals that have proved successful in reducing preventable readmissions will facilitate the transitions for physicians. The transition model is a comprehensive approach incorporating different approaches found to significantly reduce readmissions.

The financial consequences of readmission need to be significant enough to motivate hospitals to reduce readmission rates, without penalizing hospitals for events over which they have limited control (Goldfield et. al., 2008). The current health reform has targeted hospitals with high readmission rates and will reduce payments to them while rewarding those who meet expectations. However, policies should focus on how to improve readmission rates for the penalized hospitals. Also from a policy perspective the key challenge will be establishing the extent of the payment reduction for readmissions.

Table 2 indicates an ideal transition home model supported by the Centers for Medicaid and Medicare. The model is a hospital approach that targets known factors of readmissions in an attempt to address and reduce readmission.

Table 2: Ideal Transition Home Model

1. Enhanced Admission Assessment of Post-Discharge Needs a. Include family caregivers and community providers (e.g., home health nurses, primary care physicians, HF clinic nurses, etc.) as full partners in standardized assessment, discharge planning, and predicting home-going needs. b. Reconcile medications upon admission. c. Initiate a standard plan of care based on the results of the assessment.	3. Patient and Family-Centered Handoff Communication a. Reconcile medications for discharge. b. Provide customized, real-time critical information to the next care provider(s) that: (a) accompanies the patient to the next institution; and/or (b) is transmitted to the receiving physician and/or home health agency or other care providers at time of discharge.
2. Enhanced Teaching and Learning a. Identify the learner(s) on admission (i.e., the patient and family caregivers). b. Redesign the patient education process to improve patient and family caregiver understanding of self-care. c. Use Teach-Back daily in the hospital and during follow-up calls to assess the patient's and family caregivers' understanding of discharge instructions and ability to do self-care.	4. Post-Acute Care Follow Up a. High-risk patients: Prior to discharge, schedule a face-to-face follow-up visit (home care visit, care coordination visit, or physician office visit) to occur within 48 hours after discharge. b. Moderate-risk patients: Prior to discharge, schedule a follow-up phone call within 48 hours and schedule a physician office visit within 5 days.

Source: Bisognano & Boutwell (2008).Improving Transitions to Reduce Readmissions. Frontiers of Health Services Management, 25 (3), 3-10.

The potential for cost savings within Medicaid along with the high readmissions rates that occur within this patient population identified an area for hospital care improvement. This study attempts to determine which factors significantly contribute to hospital readmissions in the state of New York.

Research Question:

1) What factors at the aggregate (county) level affect readmission rates?

Methodology

Data Collection

The literature discusses readmission as a hospital and individual level problem; while few of the studies discuss readmission and its factors at the aggregate level. For this study data collection was limited to using secondary data as it did not focus on an internship site. The use of secondary data shaped the study as there is limited published data on hospital readmission. The literature identified several factors that may contribute to hospital readmissions which served as the foundation for this study. To address the research question, further information was gathered on the factors identified within the literature. The chosen variables were then analyzed to determine, whether or not they affect readmission rates throughout hospitals in New York State counties.

The relevant variables were extrapolated for analysis using secondary sources available on the subject of hospital readmission rates. Data used in this research were obtained from the New York State Department of Health, Census Bureau, Hospital Compare Website and a data set compiled in the Nursing 634 course at Binghamton University. The Nursing 634 course requires the completion of a research paper using county level data. Variables used for the research paper are added to the database, while variables already included are updated using government website and statistics. The purpose was to identify the most significant socioeconomic, demographics and quality of care indicators that contribute to readmission rates within hospitals in New York State counties, using a multiple regression analysis.

Predictors

One hospital from each NYS county was selected based on whether the hospital had readmission rates available on the hospitalcompare.hhs.gov website. The website indicates how often patients are readmitted to hospitals within 30 days of discharge from a previous hospital stay (Hospitalcompare.hhs.gov, 2010). Reasons for readmissions may be for the same diagnosis, a complication of the original visit or for a different diagnosis. The website also reports how each hospital's readmission rates compares to the U.S National Rate. For some hospitals the cases were too few (less than 25 cases) to reliably tell how well the hospital was performing on a particular diagnosis. Currently, hospitals report readmissions rates for three diagnoses for Medicare patients: heart attack, pneumonia and heart failure. For this study the readmission rates from the three diagnoses became the dependent variable.

Thirteen independent variables were chosen based on the information gathered from the literature, shown on Table 3. They were categorized as either a demographic, socioeconomic, location or hospital indicator. Five demographic variables were chosen: percent of high school graduates over the age of 25, total population of White, Black and Hispanic populations, and persons over the age of 65 which will represent the possible number of people enrolled in Medicare. Total number of persons enrolled in Medicaid was used as a socioeconomic indicator. Hospital specific indicators included: the number of beds available and the average length of stay for the particular hospital. In addition four responses from a patient satisfaction survey conducted by each hospital was included: 1) percent of patients who reported that their nurses "Always" communicated well, 2) percent of patients who reported that their doctors "Always" communicated well, 3) percent of patients who reported that staff "Always" explained about

medicines before giving it to them, 4) percent of patients at each hospital who reported that YES, they were given information about what to do during their recovery at home.

Rural-Urban Continuum Codes (RUCC) developed by the Economic Research Service of the United States Department of Agriculture was used as an indicator for location. The available codes classify counties as metropolitan and nonmetropolitan by population, degree of urbanization, adjacency to metropolitan areas, and commuting patterns from nonmetropolitan counties to metropolitan counties (Economic Research Service, 2003). Nursing 634's database includes three different RU codes; this study will use the codes for rural versus urban. The code used to identify an urban area was 0; to identify rural areas the number 1 was used.

Limitations

There were several limitations within this study, particularly from using secondary data. All data used was obtained through reliable government websites, however, some of the data used was found incomplete. For example, the hospitalcompare.hhs.gov did not contain hospital information for Greene and Hamilton counties. Other data did not contain detailed information by NYS county and instead contained general state data. The total number of individuals enrolled in Medicare was unavailable, so the percent of the population 65 and over was used as its predictor, which could lessen the study's validity.

One of the biggest limitations of this study was the inability to conduct the research at the individual level of analysis. Conducting surveys and interviews would have allowed this study to be more specific instead of analyzing the problem generally. Also, the lack of variation between variables may not have allowed for the relationship to be accurately predicted.

Table 3: Variables, Indicators, Data

Variables	Indicators	Data Sources
Hospital Average Length of Stay	Hospital Indicator: Average duration of hospital stay	New York State Department of Health: Hospital Profiles
Number of Hospital Beds	Hospital Indicator: Hospitals in-patient capacity	New York State Department of Health: Hospital Profiles
Rural vs. Urban codes	Location of hospitals: Urban or rural setting	Nursing 634 database
Total number of Medicaid Enrollment	Income Indicator: Number of individuals using government healthcare program	New York State Department of Health
Population 65 and older	Demographic Indicator: Percent of the population who are eligible (and enrolled) in Medicare	Census Bureau
Percent of high school graduates over 25	Demographic Indicator: Education level	Census Bureau
Percent White Population	Demographic Indicator: Approximate percentage of the population who are White	Census Bureau
Percent Black Population	Demographic Indicator: Approximate percentage of the population who are Black	Census Bureau
Percent Hispanic Population	Demographic Indicator: Approximate percentage of the population who are Hispanics	Census Bureau
Percent of patients who reported that their nurses "Always" communicated well	Hospital Indicator: Patients satisfaction with nurses communication	HospitalCompare.hhs.gov
Percent of patients who reported that their doctors "Always" communicated well	Hospital Indicator: Patients satisfaction with doctors communication	HospitalCompare.hhs.gov
Percent of patients who reported that staff "Always" explained about medicines before giving it to them	Hospital Indicator: Patients satisfaction with overall staff communication	HospitalCompare.hhs.gov
Percent of patients at each hospital who reported that YES, they were given information about what to do during their recovery at home.	Hospital Indicator: Patients satisfaction with nurses communication	HospitalCompare.hhs.gov

Data Analysis

All of the independent variables shown on Table 3 were used in an attempt to answer the

research question: What factors at the aggregate level affect hospital readmissions? A correlation

matrix was used to determine whether there is a significant relationship between any of the independent variables, and reduce the risk of mulicollinearity. It also allowed identifying variables that may be measuring the same concept.

Further analysis of the data was conducted using multiple linear regression on the statistical analysis software, SPSS. All of the data used for this study were interval therefore, to determine which independent variables predict hospital readmission rates for heart attack, heart failure and pneumonia, multiple linear regression deemed the most appropriate.

Findings

Using SPSS, a regression analysis was conducted on each of the diagnosis specific readmission rate. The first regression model was significant, capturing a 52.4% of the variation in heart attack readmission rates among New York State counties with a significance value of .027. The last two regression models were not significant, resulting in a p= .358 for heart failure and p=.418 for pneumonia readmission rates.

Table 4 shows the predictors, the beta values and the significance levels of the regression analysis for the heart attack diagnosis. The results of the regression demonstrated that the relationship between readmission rates for heart attacks and percent of the population aged 65 and over, Hispanic population, high school graduates over the age of 25, hospital average length of stay, hospital number of beds, location (Rural versus Urban) were not significant. Patient survey questions 1, 2, and 3 were also found not significant. The regression model for heart attack indicates that as readmission rates increase, the percent of patient's at each hospital who reported that YES, they were given information about what to do during their recovery at home decrease *(b=-.118)*. For example, Peninsula General Hospital in Queens County has a

heart attack readmission rate of 19.9%, which is no different than the national average of 19.9% and has a 70% response rate for patient satisfaction question 4. While Geneva General Hospital in Ontario County, has a lower readmission rate compared to Peninsula, 18.3% and has a higher response rate to question 4, 87%.

The results also show that as the demographic population of White people increases, readmission rates for heart attack also increases (b= .155). As the percent of the population who are Black increases, readmission rates for heart attack also increases (b=.282), indicating higher risks in readmissions for Black populations.

Table 4: Regression Results Predicting Readmission Rates for Heart Attack

Predictors	B value	SE B	P value
Constant	15.011		.104
Hospital Length of Stay	.158	.107	.504
Number of Hospital Beds	-.951	-.154	.373
Rural vs. Urban	-.511	-.235	.343
% 65 and above	-.052	-.088	.571
% White population	.155	1.846	.029
% Black population	.282	1.289	.023
% Hispanic population	.118	.647	.172
High School graduates over 25	-.043	-.179	.274
Total number of people enrolled in Medicaid	-2.27	-.081	.776
Survey Response 1	.096	.444	.189
Survey Response 2	-.038	-.179	.577
Survey Response 3	-.011	-.059	.838
Survey Response 4	-.118	-.587	.031

Notes: R^2=.524 (p <.05).

Implications for Practice

Several implications can be drawn as a result of this study. At the county level, the study shows that communities with larger demographic populations of White and Black have an increase

risk of readmissions for a heart attack diagnosis. However, those with larger Black populations are at a higher risk for readmission. The study also demonstrated that many of the hospitals with higher readmission rates for patients with heart attack did not always receive information on what to do when they were discharged for recovery at home. Other county level predictors did not accurately predict readmission rates for heart attack and none were significant for heart failure and pneumonia diagnosis. Other factors which according to the literature affect readmission, such as gender and socioeconomic status were not significant at the county level. The following are practices that may be beneficial for reducing readmissions:

- Ensuring all patients have proper education for home recovery

- Gauging patients understanding through "Teach-Back" method

- Future studies at the individual level to identify underlying factors for readmissions

- Home visits and/or phone calls to patients after discharge

It could be inferred that county level research does not provide sufficient information on how to reduce hospital readmissions. However, at the hospital level readmission may be reduced by ensuring that all patients receive proper information on what to do when they are home. The Home Care Transition model shown in Table 1 indicates that using the "Teach-Back" method in the hospital and during follow-up calls to assess the patients or caregivers understanding of the instructions can be beneficial in reducing readmissions. Ensuring that patients have the proper information and have an understanding of it may be vital to reduce readmission.

Since factors at the patient level were not studied it is difficult to infer what causes these specific population groups to be readmitted. Further studies specifically geared towards the Black population are needed to identify and reduce hospital readmissions. The literature states that the discharge process is highly important in the reduction of readmissions. Some suggestions derived

from the literature specifically for heart attack and heart failure patient, propose that the discharge process should start as the patient is admitted to ensure that the hospital staff is aware of the home environment. Home visits and or phone calls (daily or weekly) within those 30 days of readmission may prove helpful in reducing readmissions.

Many hospitals use agencies such as the Visiting Nurse Service of New York who provide specialized nurses for home care services. Using these agencies when the hospital staff is aware that there may be no caregiver, or support in the home is essential. Hospitals can also use student nurses to make the home visits and/or phone calls. New technology is able to transmit patient information to nurses daily, such as the patient's heart vitals, pulse and blood pressure.

Conclusion

This study attempted to identify factors that may be related to hospital readmissions at the aggregate level. Although few of the indicators were found to be significant; research at the patient level may be more beneficial. Patients are re-hospitalized for several reasons, some of which are out of the hospitals control. County level data did not take into account individual factors which have a stronger effect on readmissions. One of the main focuses of this study was to determine factors related to readmissions within Medicare patients, however, at the county level Medicare enrollment was not significant. Thus, county level data does not accurately predict readmissions. This study did identify that hospitals that do not provide information about what to do for home recovery, heart attack diagnosis and communities with large Black populations, are at higher risk for readmissions. However, this study was unable to identify why Black communities have an increase risk for readmissions or why some patients did not receive information for home recovery. Studies that focus on the underlying reasons for patient's re-hospitalizations will enable hospitals to create policies and regulations that will improve the quality of care provided.

Currently, readmissions are part of the health care reform which will bring changes to Medicaid and Medicare reimbursement practices in an attempt to reduce waste. The incentives to reduce readmissions are high as federal reimbursements practices, patient safety, and quality care will change. Studies on best practices will be essential for hospitals and the health care system to reduce readmissions, especially for those in Medicare.

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